AN INVESTIGATION OF THE POTENTIAL FOR ACTIGRAPHY TO BE USED AS A MEASURE OF SITTING DISCOMFORT: PRELIMINARY RESULTS

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INTRODUCTION

The prevention of discomfort is of paramount importance to an individual sitting in a chair. However, it is often difficult for researchers to relate discomfort to specific biomechanical variables [1]. Recently, there has been some interest in the use of dynamic pressure distribution data as a measure of discomfort [2]. This work is based on the hypothesis that the in chair movement (ICM) presented by a sitting subject – consciously or unconsciously - will vary as time passes in a manner that is influenced by their level of discomfort [3].

Actigraphy, the use of body mounted accelerometers to determine movement and postural changes, is being used for an increasing number of clinical and industrial applications [4]. The aims of this study were to investigate the potential for actigraphy to be used to measure ICM and determine if the data generated could be related to perceived sitting discomfort.

METHODS

The device used to measure the subjects' activity was the *Activ*PAL™ Trio (PAL Technologies Ltd, Glasgow, UK), a triaxial (incorporating 3 accelerometers allowing movement to be measured in several directions) activity monitor chosen because of its compact size and data logging capacity. The purpose of the activity monitor was to detect distinct postural changes (DPC), defined as a variation of at least 10° of the subject measured across all channels and maintained for over 20 seconds. The ability of the activity monitor to pick up these shifts in position was tested by comparing the ICMs noted by an observer watching video recordings of 2 test sessions and those identified from the activity monitor data.

12 subjects (9 males and 3 females) volunteered for the study. Four different chairs were used in the experiment and each subject sat in every chair (randomised order) for 100 minutes. The monitor was attached at the top of the subject's sternum. Perceived discomfort was measured using the Category Partitioning Scale (CP-50) [5] and data were collected at 20 minute intervals during the sessions.

RESULTS AND DISCUSSION

Correlations between the observed and detected movements were high ($r^2 = 0.95$, $p < 0.05$). Analysis using the Friedman test showed that both the number of DPCs and the subjects' perceived discomfort varied significantly over time and with the chair being tested. Regression analysis of the data (summarised in table 1) showed that for DPCs as the dependent variable, perceived discomfort, as measured by the CP-50, explained 22.8% of the variance. With the demographic, time and chair variables included in the model, an additional 32.6% of the variance was explained. These results suggest that a larger test sample may provide a more accurate prediction tool.

These results should be interpreted with some level of caution as a number of other factors, such as boredom, may influence ICM. They do however suggest that using actigraphy could potentially be a useful tool in seating discomfort research. Using actigraphy to measure sitting discomfort has the advantage that the equipment required is both small and lightweight, making it more suitable for field work in comparison to other currently used discomfort measurement techniques including monitoring pressure distributions.

REFERENCES

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Table 1: Summary of: demographic variables; discomfort measure variables; and regression analysis

	Median (IQR)[a] / Mean (SD)[b]*	Regression analysis		
		B	***β***	***P*-value**
Gender	N/a	-0.475	0.397	0.232
Age	25.75 (25.75, 26.5)[a]	-0.568	0.09	>0.001
Mass (kg)	73.03(15.4)[b]	0.033	0.012	0.007
Height (mm)	1753(84)[b]	-0.009	0.002	>0.001
CP-50	3.5 (0, 10)[a]	-0.017	0.019	0.385
Chair type	N/a	-0.0661	0.133	>0.001
Time	N/a	0.03	0.005	>0.001

B: unstandardised beta coefficient; *β*: standardised beta coefficient
* Anderson-Darling test used to test normality of data